All patients with diabetes should have annual UACR tests. Why is that so hard?

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ABSTRACT

The urine albumin creatinine ratio (UACR) detects abnormal levels of protein in the urine and should be performed annually to detect kidney disease in patients with diabetes mellitus. UK national audits show that 25% of patients do not have annual tests and our data suggested that some patients had more than one test per year.

Data from 20 patients showed that 55% had more than one UACR test per year, with a total of 19 unnecessary tests at an estimated cost of £20,000 per year. However 20% had not had a UACR in the previous year, so unreliable testing was potentially causing harm as well as waste. Process mapping showed that having a UACR test depended on whether the patient brought a urine sample to the clinic. Most (72%) patients were unaware that the urine sample was used to detect kidney damage. We encountered barriers when finding a process to automate measures of reliability of UACR testing using computer protocol, and therefore created a patient information leaflet. The first version of the leaflet was too technical and several changes were suggested by patients. After reading the revised leaflet 99% of patients understood the reason for UACR testing and 64% felt more motivated to bring in urine samples. The phlebotomist disseminated the patient information leaflet with a median of 90% reliability for six consecutive clinics. The patient information leaflet has the potential to improve patient involvement in their care and to increase the number of patients who bring urine samples to the clinic. However, this could increase the number of unnecessary tests unless the process of test ordering is changed to ensure that UACR is only measured annually.

PROBLEM

The two key markers for chronic kidney disease (CKD) are urine albumin and estimated glomerular filtration rate (eGFR).[1–3] The UACR is the most reliable screening test and should be performed yearly to diagnose and monitor kidney damage in patients with type 1 diabetes for five years or more or with type 2 diabetes.[2] Furthermore it is important to agree the frequency of monitoring UACR, as patients with, or those who are likely to develop, the disease must be monitored more regularly.[1]

Our team consisted of a consultant diabetologist, the Medical School Lead for Quality Improvement, the Teaching Lead for Patient Safety, the phlebotomist and lab technician working at the diabetes clinic and a third year medical student. We were concerned that UACR tests were either being performed too frequently at the diabetes follow-up clinic at the Strathmore Diabetes Centre, or not at all. Baseline data, however, confirmed that not only did 55% of patients have multiple UACR tests per year, 20% of patients had waited more than the recommended 12 months for their next UACR test.

Our main concerns were the waste of resources caused by too many UACRs and the potential harm caused by patients having too few. The two aims of this project were therefore to: improve the reliability of the system for UACR testing with the outcome of reducing waste from excess testing and reducing harm by ensuring all patients have an annual UACR; involve patients more in their care with the outcome of their having a better understanding of kidney disease and why bringing in urine samples is important.

BACKGROUND

There are 3.3 million people diagnosed with diabetes in the UK and an estimated 590,000 people who have the condition, but don't know it.[4] Damage to the kidneys as a result of diabetes is a significant risk factor for the development of end-stage renal disease and the need for renal replacement therapy. Diabetes is the most common cause of established renal failure requiring renal replacement therapy. People with diabetes are almost one and a half times more likely to need renal replacement therapy than peers in the general population.[5] In the UK, 57% of patients starting dialysis in 2014 had diabetes.[3 6]

There is evidence that providing a coordinated approach involving early screening and prompt referral to specialist teams when necessary, using medications with proven effectiveness, and increasing patient awareness can reduce the burden of diabetes with kidney disease.[5] However urine testing for albumin was the least frequently completed of eight key care process in each of the UK National Diabetes Audits, with only 74% reliability in 2012/2013[7] and a large cohort study in the Netherlands found that only 24% of patients with Type 2 diabetes had an annual UACR test and 25% of patients had never had a test.[8] However, although all guidelines recommend no more than annual tests for UACR to screen for kidney disease[1–3] previous audits of the reliability of care processes have not included the frequency and cost of unnecessary, additional tests.[7 8]

BASELINE MEASUREMENT

Two baseline measurements were completed in May 2015. The first used SCI-Diabetes, a patient information database for those with diabetes who live in Scotland. This measurement assessed the frequency of UACR testing in 20 patients and found that only 25% of them had a single UACR test in the previous year, 20% had no test, and the remaining 55% of patients had more than one test, with a total of 19 unnecessary additional UACR tests. The second measurement asked 18 patients, who were approached during clinic hours, whether they knew why they need to bring in a urine sample. We found that 50% did not bring in a urine sample on the day of their clinic appointment and 85% did not know why they needed to bring in a sample. Most patients thought the urine sample was for the monitoring of sugar or ketones, and others for "diabetes control".

DESIGN

The first method for improvement was to change the computer programming system at the diabetes centre, so that the staff are notified when the annual UACR is due or if too many have already been done. With this method, our target was for 95% of patients attending the clinic to have an annual UACR test in 10 weeks, ie the scope of the project. This proved difficult due to time constraints. To change the computer system, we had to set up multiple meetings weeks in advance with a number of staff members. This was out of the timeline for this project and we therefore have no measurements for this intervention.

A second method was used to improve the involvement of patients in their care and their understanding of why kidney disease is an important complication of diabetes. We did this by handing out a patient information leaflet (Supplementary Material 1 - Run Chart Summary, Slide 9) and, by doing so, we assumed that patients would be self-motivated to ensure they had received an annual UACR test. To prove this, we would have to wait for these patients to return to the clinic in six months time and take measurements, which was beyond the scope of the project. By the time we had developed our second method, we had only three weeks remaining. We would like to undertake a future project to look at this.

The following measurements are from the second intervention only:

Process: the percentage of patients that were handed the information leaflet by the phlebotomist

Outcome: the percentage of patients who understood why they were asked to bring a urine sample to the clinic before and after reading the leaflet; patient satisfaction with the kidney disease information leaflet (%); patients' motivation to bring in a urine sample after reading the information leaflet (%)

Balancing: the percentage of patients who had concerns about the kidney disease information leaflet and time required for staff to hand out the kidney disease information leaflet or answer questions from patients.

The patient information leaflet was a single A4 sheet printed in black and white. This was given to each patient by the phlebotomist along with a urine sample pot for the next clinic appointment. It was anticipated that sustainability might be compromised by the need to print out information sheets before clinic starts. There is a large printer in the clinic that is used frequently by the receptionist so her support is critical. In the future, we will ask for NHS Tayside's agreement to print the leaflet, which will greatly improve sustainability. The leaflet was approved by the consultants in the clinic and followed the NHS Tayside patient information protocol. The patients were asked to read the leaflet during the waiting time at the clinic, and were asked the following questions before they left the clinic:

a. Do you bring a urine sample to every clinic?
b. Do you understand more about kidneys and diabetes after reading the kidney disease leaflet?
c. Have you found reading this leaflet has raised any concerns? If yes, please specify.
d. Are you more motivated to bring in a urine sample to your next appointment?

STRATEGY

Process mapping was used to identify opportunities for giving the information leaflet to patients and measuring how much time they had to read the leaflet in the clinic (Supplementary Material 1 - Run Chart Summary, Slide 3).

Plan Do Study Act (PDSA) cycles were used to test changes (Supplementary Material 2 - PDSA Cycles - Sets 1 and 2). There are two sets of cycles. The first is entitled "PDSA Cycles, Intervention: Introduce a patient information leaflet about kidney disease and the value of UACR measurement as a screening test." The second, "PDSA Cycles, Original intervention: Introduce a computer protocol for annual testing of UACR, rather than automatic testing whenever a patient brings in a urine

sample." We have summarised the two PDSA cycle sets below.

PDSA Cycles, Intervention: Introduce a patient information leaflet about kidney disease and the value of UACR measurement as a screening test:

The patient information leaflet was written following NHS Tayside patient information guidelines and approved by staff before it was tested with 10 patients in one clinic (PDSA Cycle 1, Intervention). The medical student handed the leaflets to the patients while they were having blood taken. There was not enough time for the patient to read the leaflet and patients seemed very disinterested in the information. The leaflet received poor patient feedback: the wording was too technical, e.g. "microalbuminuria", and this stopped patients from understanding the information; some patients did not think having knowledge of kidney disease is important; as soon as the patients looked at the leaflet, they seemed disengaged (unattractive layout).

The design and wording of the leaflet was improved after PDSA Cycle 1, and kept the same from PDSA Cycle 2 onwards. The word "microalbuminuria" was removed and replaced by "protein in the urine", and other wording was simplified to make for easier reading. More pictures were added and text was deleted to provide more empty space on the page. Bold text was used to highlight important words ("damage", "albumin"), and repetition of important ideas e.g. "damaged blood vessels […] become leaky" were repeated so the patients could consolidate what they have learned.

This improved leaflet was given to the patients by the phlebotomist, instead of the medical student. She explained what the urine sample was for and told the patients to read the information before being asked them questions in the waiting room. This increased patient compliance to read the leaflet as they regard the phlebotomist as a friend. Feedback for this leaflet was very positive, and all patients said the leaflet was easy to read and understandable. Most patients felt more motivated to bring in urine samples having learned more about kidney disease and why it's important to bring one in. Patients who did not feel more motivated already knew about kidney disease. Two patients had not brought in a urine sample for a long time, and they described themselves as being highly motivated to bring them in after reading the leaflet - both of these patients said it gave them new information and that they would ask their doctor for advice on UACR testing.

PDSA Cycles, Original intervention: Introduce a computer protocol for annual testing of UACR, rather than automatic testing whenever a patient brings in a urine sample:

The need for a better system of UACR testing was agreed by the consultants in the clinic, with the caution that patients with abnormal UACR test results should have more than one UACR test per year.[1–3] The medical student had a meeting with the lab technician and from this created guidelines for the lab technician to give to her supervisor, so that the computer protocol could be changed. However, her supervisor suggested meetings with different staff members that were set for a few weeks' time. This was outwith the project timeline. We estimated the cost of unnecessary UACR tests for patients attending the Strathmore Clinic to be £423 per week, which adds up to £22,004 per year (Supplementary Material 3 – BMJ Cost Savings Calculator).

RESULTS

The first version of the leaflet only achieved 20% patient satisfaction (Supplementary Material 1 - Run Chart Summary, Slide 4) and had no impact on patient understanding or motivation (Supplementary Material 1 - Run Chart Summary, Slides 5 and 6). The information proved to be too technical and the layout discouraged patients from reading it as it had too much text - reading it was a demanding task.

After redesigning the leaflet content and distribution, 95% of patients understood why their urine was tested and being more motivated to bring in a urine sample to their next appointment (Supplementary Material 1 - Run Chart Summary, Slides 5 and 6). All of the patients said that the leaflet was helpful, and patients commented that they liked being given more information about how diabetes may affect them and that information about kidney disease information was a good idea.

Handout of patient leaflets by the phlebotomist was a reliable process (Supplementary Material 1 - Run Chart Summary, Slide 7) and also enabled discussion with patients about the leaflet content. As expected, during the three weeks of testing the information leaflet there was no change in the % of patients who brought urine samples to the clinic, which fluctuated from 40-90% (Supplementary Material 1 - Run Chart Summary, Slide 8).

LESSONS AND LIMITATIONS

The medical student found that leading an improvement project had several important learning outcomes. First, identifying and involving key-stakeholders, like the phlebotomist and the lab technician, was vital to running tests on suggestions for improvement. It would not have been possible to sustain the information leaflets without the phlebotomist agreeing to hand them out, and her encouraging patients to read the information was a great help to gathering data. Second, spending 10 weeks in the clinic led to the development of friendships with the staff members, and for this reason it became easier to work together as a team. Third, the work was patient-centred and talking to patients in the waiting room gave better insights into patient experience than sitting in on consultations with the diabetologist. Finally, the barriers to improving the reliability of UACR testing were excellent learning opportunities for systems thinking.

At the same time, the lead investigator being a medical student caused difficulty in gaining access to patient data on UACR testing from SCI-Diabetes, which we needed for our initial measurements of how many patients have an annual UACR, and being able to receive patient feedback. We addressed this by: applying to the Caldicott Guardians for NHS Tayside to be granted access to look at patient data on SCI-Diabetes; applying to the University Research Ethics Committee (UREC) for approval to ask patients for feedback and publish the data gathered from this; establishing the need for a reliable, transparent policy on ethics and governance of improvement projects in NHS Tayside.

However, the project length was 10 weeks, and the current systems of applying for approval stopped work being done for long periods of time. The difficulty we encountered with the UACR data was not that the information is unavailable – it is all uploaded onto SCI-Diabetes – but that we could not access the hub of data because we lacked the necessary permissions.

The restrictions of being a medical student, with regard to accessing data and even being allowed to ask patients for feedback were time-consuming and required a lot of effort to overcome. The need for a clear policy for governance and registration of student and Early Career Professional improvement projects has been recognised by the Academic Health Sciences Partnership in Tayside and included in their Better Professional Development programme.[9] This work will be led by NHS Tayside's Head of Clinical Governance.

We have also reviewed and questioned our results. We need a larger cohort of patients to ensure this is not the case. After reading the information leaflet, patients were asked by the medical student for their opinion on the content. The student introduced herself as part of the team who created the leaflet, and therefore the patients may have felt biased to speak more highly of it. In future studies, the student will not mention his or her connection to the leaflet. Confounding factors were identified as the friendliness of the medical student and the variation in intelligence of the patients. Future studies will ensure the students introduce themselves and only ask the required questions, so patients do not feel obliged to be more positive about the leaflet because they like the student. Patients may not have fully understood the leaflet before commenting on its effectiveness, so a short questionnaire may be helpful to show that patients are giving reliable feedback. A small number of the 2000 patients attending the diabetes centre were questioned about the leaflet and we did not perform statistical testing. Our results could therefore be due to chance. We would like to undertake ongoing measurement and statistical testing on a greater number of patients in the future.

The leaflet is sustainable, as it requires one sheet of paper with black and white ink, which can be printed in bulk, to be available to the phlebotomist. In this study, she handed the leaflet to the patients but patients' taking the leaflet as they leave the room should also be tested. This will then save the phlebotomist time and the patients can read the leaflet while they wait for their appointment with the consultant. The sustainability of this project relies upon the willingness of the phlebotomist to ask patients to read the leaflet and leaflets always being present in her room. To ensure this, we hope to later have the leaflet printed by NHS Tayside. In this vein, we also hope that the leaflet can be handed out in multiple NHS hospitals as we feel it is generalised – it is written in a way that the patients we tested understand, from whom we had very positive feedback.

It was not possible to make changes to the UACR computer protocol within the short time available for this project. System change will require collaboration between the quality improvement team, the staff in the diabetes clinical, and the biochemistry staff and meetings will take place in the future.

CONCLUSION

The two aims of this project were to: improve the reliability of the system for UACR testing with the outcome of reducing waste from excess testing and reducing harm by ensuring all patients have an annual UACR; involve patients more in their care with the outcome of their having a better understanding of kidney disease and why bringing in urine samples is important.

We achieved the second aim but not the first. We were therefore unsure about the consequences of further implementation of the information leaflet. Increasing awareness of kidney disease and the importance of urine samples should encourage patients to bring in a sample, which could reduce harm by ensuring patients have an annual UACR. However, this would probably increase the number of excess tests if more patients bring in samples and no computer protocol is in place to ensure only one annual test. Whilst it is possible that the leaflet could educate patients on the need for one test a year, we thought it more likely that the information leaflet would increase waste in the absence of a reliable system for eliminating unnecessary repeat tests.

Overall, our project has been successful at improving patient awareness of kidney disease and encouraging them to bring in samples. Our finding that 20% of patients attending the clinic had not had an UACR test in the previous year is consistent with the UK National Diabetes Audit findings, in which 25% of patients did not have an annual test.[7] There was no improvement in the reliability of UACR testing from 2010-13,[7] so our information leaflet has the potential to close an important gap in the quality of care for patients with diabetes. However, previous audits have not measured waste from unnecessary UACR tests[7 8] and we estimated that even in one clinic this was costing NHS Tayside £20,000 per year (Supplementary Material 3 – BMJ Cost Savings Calculator). Our project shows that a simple information leaflet can have a positive impact on patient education.

We suggest that other diabetes clinics check whether their patients know about kidney disease and think about creating an information leaflet to aid their understanding but that they should also look at the reliability of their systems for eliminating unnecessary repeat UACR tests.

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Declaration of interests None to declare.

Ethical approval In the absence of a clear policy about student involvement in audit and quality improvement in NHS Tayside, approval for testing the patient information leaflet was obtained from the University Research Ethics Committee.

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